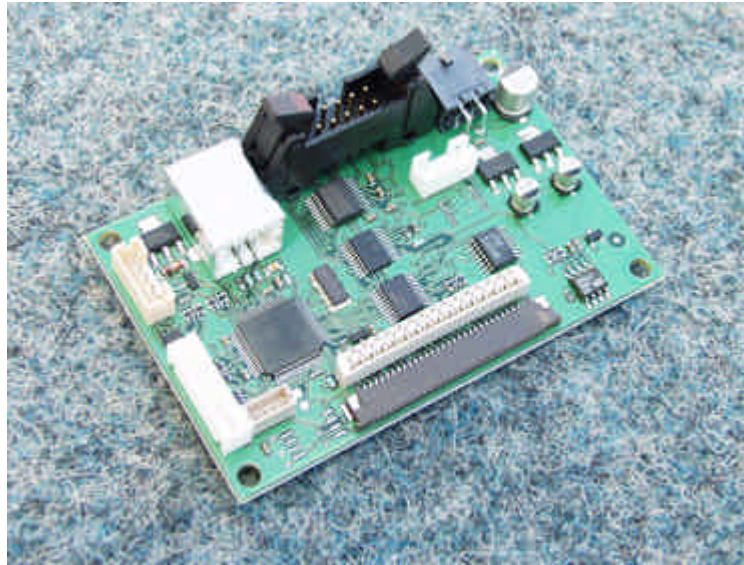# User Manual

Thermal printer controller
PRN608-S

FOR FUJITSU THERMAL PRINTERS
FTP608 SERIES

VERSION HISTORY

Version	Date	Init	Status	Description
1.0	030328	BB	Released	First release

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Windows is a trademark of Microsoft Inc.

Safety Precautions

- Please read and understand these specifications thoroughly before
  using the printer. Please keep the specifications carefully in a place
  where they may be easily consulted when the printer is used.
- Please do not modify or service this printer as this may cause
  unpredictable faults to occur.
- The product is not intended to be installed in devices such as those
  used in life-support medical equipment, undersea relays, and
  aerospace applications or for nuclear power control, in which
  extremely high reliability is required. If you are considering such
  applications, please consult our customer service department.
- There is a general possibility of component failure. Every effort has
  been made to improve product quality but such failures cannot be

completely excluded. Please assume that such failure may occur before using this printer.

We would urge that these specifications should be thoroughly understood and the printer used safely in your company or associated organisation. Please indicate or describe in your products and in the user manuals those items, which are related to the prevention or avoidance of danger and draw these to the attention of the eventual client (the user).

I/F-COM

I/F-COM

1   SYSTEM DESCRIPTION

This reference manual describes the specifications, functions, and operating procedures for the PRN608-S Interface Board.
The PRN608-S is an interface board for the FTP608 series printer mechanisms.
This reference manual also describes the print operation of the FTP608 series. Read this reference manual thoroughly before using the PRN608-S. PRN608-S is designed for the following Fujitsu printers:

FTP-628MCLxxx
FTP-638MCLxxx

PRN608-S consists of an interface board.
The communication is RS232, USB or IRDA.
PRN608-S can print graphic data either compressed or non-compressed.
Burn time can be set to control the printing intensity
Windows 95/98, 2000, NT and CE drivers are available at http://www.if-com.com, for easy operation by PC. Linux drivers are available upon request.

2   INSTALLATION

2.1   Unpacking

Remove the cover observing precautions for Electro Static Discharge (ESD). Make sure that board is handled with care with respect to Electrostatic environment.

2.2   Labels

PRN608-S has 3 labels;
Label 1 on backside ex. Ifxxxxxx is a unique ID number. For service and question based upon 1 particular board please refer to this number.
Label 2 on topside ex. PRN608-S is part number. Please refer to this number upon reordering. Make sure that software revision is applied at same time.
Label 3 is an internal code. Please ignore.

2.3   Installation

PRN608-Sis fastened in the product by 4 M3.3 screws. The cables (for the thermal head, the stepper-motor and detector) are placed in the

thermal printer connector on the PCB. 1 Mounting hole is grounded. See drawing for more details.

(a) To connect or remove the connector, always turn off the power in advance. If the connector is connected or removed while the power to the printer is on, errors may occur.

(b) The connector of each cable must be correctly locked and connected. The connector at the head side has no lock feature. Check that the connector at the head side is completely inserted.

(c) To install the interface, carefully check each cable so that excessive force is not applied to each cable. Especially, carefully check the head connection cable because it affects the head pressure force. If the print head connector is not completely connected, overheating or burning may occur in the print head.

2.4   Power supply

Single power supplies for the PRN608-Scontroller board. Voltage range is 6-8,5VDC. 4A minimum @ 7,2V. Make sure that voltages never exceed 8,5VDC.

(a) The power supply unit that satisfies the specified specifications must be used. If a power supply unit that does not satisfy the specified specifications is used, normal operation is not assured and errors may occur.

(b) To turn on or off the power, a protective circuit must be mounted on the control board in advance. For safety, the following voltage change conditions must be satisfied:

2.5   Settings

Following below description can change default settings. Baud rate is default 115.200, however standard PC´s today cannot handle this Baud rate. Windows OS does not support speed higher than 115.200 Baud,

even when setup menus can be set to higher speed. In order to obtain higher speed you need to install 3rd part utility program on PC. Please visit www.if-com.com for further information.

1. Turn off power
2. Press Key 1 low while power up. Board is now in setting mode. Text will be printed on paper for further information
3. By activating key 1 and 2 you can change following parameters:
    a. Test printout
    b. Select Command set
        i. I/F-COM command set (Default)
        ii. Seiko compatible command set (Optional)
        iii. Fujitsu compatible command set (Optional)
        iv. APS compatible command set (Optional)
        v. ESC/POS compatible command set (Optional)
    c. Baud rate
        i. 9600
        ii. 19.200
        iii. 38.400
        iv. 57.600
        v. 115.200 (Default)
        vi. 230.400
        vii. 460.800
    d. Parity
        i. 0 (Default)
        ii. 1
    e. Data bit
        i. 7
        ii. 8 (Default)
    f. Stop bit
        i. 1
        ii. 2
    g. Flow control
        i. None
        ii. Hardware (Default)
        iii. Xon/Xoff
    h. Dot size of printer (See note*)
        i. 384 dots (Default)
        ii. 432 dots
        iii. 448 dots
        iv. 512 dots
        v. 576 dots
        vi. 640 dots
        vii. 832 dots
        viii. 1152 dots
    i. Key 1 function

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     1. Input key (Default)
     2. LED output
     3. Label detect
     4. Black mark detection
     5. Paper near end function

  j. Key 2 function
     1. Input key
     2. LED output
     3. Label detect
     4. Black mark detection
     5. Paper near end function
  k. IRDA
    i. Enabled (Optional)
    ii. Disabled
  l. Auto form feed
    i. 0 sec.
    ii. 1 sec.
    iii. 2 sec. (Default)
    iv. 3 sec.
    v. 4 sec.
    vi. 5 sec.
  m. Form feed length
    i. 0 mm
    ii. 1 mm
    iii. 2 mm
    iv. 5 mm
    v. 10 mm
    vi. 20 mm
    vii. 30 mm
    viii. 50 mm (Default)
  n. Grey scale printing
    i. On (optional)
    ii. Off
  o. Acceleration
    i. Slow
    ii. Medium
    iii. Fast
    iv. Disable (Default)
  p. Printing speed
    i. 25%
    ii. 50%
    iii. 75%
    iv. 100% Default)
    v. Disable
  q. Burn strobe dark

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        i. 0 (Default)
        ii. 1
      iii. 2
      iv. 3
        v. 4
      vi. 5
     vii. 6
    viii. 7
      ix. 8
        x. 9

r. Burn strobe light
        i. -1
        ii. -2
      iii. -3
      iv. -4
        v. -5
      vi. -6
     vii. -7
    viii. -8
      ix. -9

Settings will be effective upon turn off and on.
* FTP628MCL00x/30x must be set as 384 dots.
* FTP6x8MCL05x/1xx and FTP6x8MCL35x is auto detected.

2.6   Serial Input/Output

If BUSY control is selected:
When 236 bytes of data have been stored in the input buffer, the SBUSY signal becomes high to request that the computer temporarily stop sending data. When the amount of data stored in the input buffer becomes 235 bytes or less, the SBUSY signal changes to low to request that the host device continue data transfer. Up to 16 bytes of input data are guaranteed after the SBUSY signal has become high. When an error occurs, the SBUSY signal becomes high. Data input is prohibited until the error is cancelled.
If Xon/Xoff control is selected:
When 188 bytes of data has been stored in the input buffer, Xoff (13_{16}) is output through the TxD terminal to request that the host device temporarily stops sending data. When the amount of data stored in the input buffer becomes 124 bytes or less, Xon (11_{16}) is output to request that the computer continues data transfer. Up to 64 bytes of the input data are guaranteed after
Xoff has been output. When an error occurs, the Xoff signal is output to prohibit the data input.

When the error is cancelled, Xon is output.

2.6.1 Serial data transfer

The PRN608-Stransfers various data other than the Xon and Xoff codes which are output when controlling Xon and Xoff.
Regardless of whether the input mode is serial or parallel, the following data is transferred through the TxD terminal.
(a) Error codes when a hardware error occurs at initialisation
(b) The data when executing the Vhead voltage response
(c) The data when the error status response is set and an error occurs
(d) The data when executing the execution response request
(e) The data when executing the remaining RAM capacity response (DC2+'r')
(f) The data when executing the environmental temperature response (DC2+'t')
At the selection of serial input, data (b) through (f) is transferred according to the transfer conditions, which are set using the function switches. However, the hardware error code (a) has the same conditions as those for parallel input.
When transferring data, data control by SBUSY and Xon/Xoff is not executed and the data is transferred with no conditions.
All of the transmission conditions of serial data transfer for sending hardware error codes are fixed at the selection of parallel input as follows:

2.6.1.1 Serial input/output port

Serial data output (TxD)
> When Xon/Xoff control is selected, the Xon/Xoff signal is output.
> Data is output according to the transmission conditions, which are set by the function switches.
> All response data is output.

Serial data input (RxD)
> Data input port
> Data is input from the host device according to the transmission conditions, which are set using the function switches.

Serial busy (SBUSY)
> Indicates whether or not the PRN608-S is ready to receive data.
> When the SBUSY signal is low, data can be input.
> When Xon/Xoff control is selected, SBUSY is always low.

2.6.2 Setting functions

Error processing when receiving serial data
The PRN608-S receives and checks serial data according to the transmission conditions.
When the PRN608-S has received one byte of data without errors, the data is stored in the input buffer.
If there are any errors, the following data is stored in the input buffer according to the type of error.
Error type Error code
Parity error (!: 21_{16})
Framing error (?: $3F_{16}$)
If the input data cannot be printed correctly and instead "!" or "?" is printed, the transmission conditions between the host device and the PRN608-S most likely does not match. If this happens, adjust the conditions so that they match.

2.7   THERMAL HEAD CONTROL

Data Transfer to the Thermal Head
The PRN608-S transfers one dot line of data at 6 Mbps synchronized with the CLOCK signal.
The data is transferred in order to the shift register inside the thermal head from the left (when facing the paper feed direction).
The transferred data is then transferred by the head latch signal to the latch register inside the thermal head. Turning on the head strobe signal initiates printing of one dot line of data on the thermal paper.

2.7.1   Thermal Head Drive Operation

Generally, when the line thermal head is operating, the line is divided into several blocks, which are activated one after another in succession.
For the line thermal head of the FTP608 printer mechanism, the line is divided into 7 blocks called physical blocks, 216, 288 or 416 dots with each. A strobe signal (/ST1 to /ST7) is allocated to each physical block to activate it. To drive the head, physical blocks are activated in groups. The group of physical blocks is called a logical block.
For the PRN608-S either dynamic division or fixed division can be selected as the method of division for logical blocks. This selection is made through a function. See settings for more information.

2.7.2   Peak power limitation

The PRN608-S counts the number of dots activated in each physical block and groups the physical blocks into logical blocks to print a single

dot line so that the number does not exceed the specified maximum number of activated dots. The PRN608-S determines logical blocks each time it prints a single dot line.

In dynamic division, in order to avoid unclear printing, at the first step of the motor the thermal head is driven and at the second step the paper is fed.

Also, since the order of the printing blocks and printing speed are changed in each dot line according to the content of the print data, print quality may be lower than that in fixed division. If print quality is regarded as important, printing in fixed division is recommended.

The maximum number of activated dots in the initialisation status is specified using the function switches.

64 through 256 dots can, however, are set using the command for setting the number of dynamic division dots.

When the maximum number of activated dots is 128 dots, and all of the dots are driven, as shown in

2.7.3 Head Control Circuit

The PRN608-S has a function for measuring the resistance of the thermal head connected to the FTP608.

The PRN608-S measures the resistance of the thermal head and detects the errors at initialisation.

Based on the measurement, the PRN608-S determines how much energy to apply. No adjustment is needed for replacing the FTP608 to get the best printing.

2.7.4 Head temperature measurement circuit

The thermistor is mounted on the FTP608 to measure the temperature of the thermal head.

The PRN608-S determines the energy to be applied to the head and also checks for head temperature errors.

If the temperature of the thermal head is -10 °C or lower, or 80 °C or higher, the PRN608-S stops driving and puts the printer in head temperature error status. If the temperature of the thermal head is returned to from -5 °C to 75 °C, the printer goes to printable status.

2.7.5 Vhead interrupt circuit

This circuit interrupts Vhead to prevent electrolytic corrosion of the thermal head and to enable the detection of the resistance mentioned above.

Electrolytic corrosion may significantly shorten the life of the thermal head. Thermal paper ordinarily contains electrolytic material to prevent sheets from sticking to each other due to static electricity. If there is too much of this electrolytic material, high temperatures and humidity cause the material to ionise, resulting in electrolytic corrosion of the thermal head.

The PRN608-S turns the FET off and breaks the Vhead applied to the thermal head during waiting status to prevent electrolysis corrosion of the thermal head.

Specifications

Default settings

Interface	Serial RS232C, USB or IRDA
Data format serial	115.200 baud, 8 data bit, none parity, 1 stop bit, hardware handshake. Baud rate can be changed by software.
Data format USB	USB Printer class specification. http://www.usb.org/developers/data/devclass/usbprint11.pdf
Data format IRDA	IRDA (Ircomm specifications) http://www.irda.org/standards/pubs/ircomm10.pdf
Command set	I/F-com
Transmission to host	Requested status etc.
Printer supply	18V to 24V DC
Power on self test	Feed
Voltage compensation	Burn time
Current consumption	Operating 130mA, Printing up to XA @ 24V (TBD)
Printing speed	60mm/sec FTP628MCLxxx, 60mm/sec FTP638MCLxxx
Fontset	Western (Code 850, char 32-159)
Character size	8x14, 8x28, 16x14, 16x28, 16x56, 32x28, 32x56, 64x112
Character type	Normal, Bold, Underline, Italic, Reverse (white on black)
Default font	16x28
Paper detect	Digital
Graphics	Normal / Compressed
Auto load	80mm
Form feed	50mm
Maximum dimensions	Width 77mm, Depth 50mm, Connected height 15mm
Mounting holes	Width 71mm, Depth 44mm, Diameter 3.3mm
Weight	25g
Temperature	Storage -40ºC to +85ºC 0-90 Operating 0C to +85ºC 10-90%RH
Shock	100G XYZ
EMC	Emission: E-Field EN50081-1-1, Conducted EN50081-1-2
	Immunity: E-field EN50082-1-1, Conducted EN50082-1-2, Over voltage EN50082-1-3
	ESD Contact discharge 4kV, air discharge 8kV
Drivers	Windows 9x, Windows CE, Windows NT, Linux, Windows2000 and Windows XP
Approvals	CE, UL
Accessories	Serial Interface cable: CBL-002, 9pol SubD, female
	Power cable: CBL-025

3 Function

3.1 General

Notice, when data is sent from the external equipment to the printer controller, all data has to be sent as binary file. If data is being sent as a character file, and some data in the file is equal to EOF, the rest will not be received.

3.2 Serial communication.

Standard communication is;
Baud rate; 115.200 Baud
Data bits = 8
Stop bits = 1.
Parity = None
Flow control = Hardware handshake

Baud rate can be changed by a software command or by entering setting mode..

3.3 USB communication.

Build in USB interface is 100% compliant to USB 1.1 and fully approved by the USB organisation. For more details please contact I/F-COM.
By plug USB cable - Host system will recognise I/F-COM interface board.
Before connecting USB cable please set USB port as offline. Interface board will automatically online USB port. Data cannot be send from interface board to host. USB is not a bi-directional communication.

3.4 IRDA communication.

PRN608-S is prepared for IRDA via connector for IRDA transmission.
Please contact I/F-COM for more information.

3.5   Firmware upgrade.

If firmware needs to be changed, alternative firmware can be downloaded.

Please contact I/F-COM for firmware upgrade or changes.

The steps to download an alternative firmware in DOS are the following.

These steps only work for a serial connection, look further down how to do it with USB.

1. Power the system off.
2. Disconnect printer.
3. Short circuit the pins "upgrade firmware"
4. Turn on printer
5. Write the following command "mode com1:9600,n,8,1", this command ensure that the serial port is at a known state.
6. Write the following command "xmode 1 +", this command sets the baud rate to 115.200, the xmode program can be downloaded from the I/F-COM web site http://www.if-com.com/data/drivers/xmode.zip
7. Run the following command, "copy "filename" /b com1". The filename represents the path and the filename of the new firmware file. This file can be downloaded from website, or can be emailed by I/F-COM.

I/F-COM also offers a Windows utility program in order to download firmware through serial port. Visit www.if-com.com for more information.

For further information about downloading with the driver, can be found in the driver installation guide.

3.6   Auto form feed

When paper no paper is present, it is possible to form feed new paper automatic. While thermal head is down, place the paper at the roller. After 2 seconds (default) the paper will be pulled in automatically. Form feed wait time is 2 sec (default), but can be changed by a command.

3.7 Character design

The following figures describes the design of different types of characters (small):

3.7.1 Normal Character.
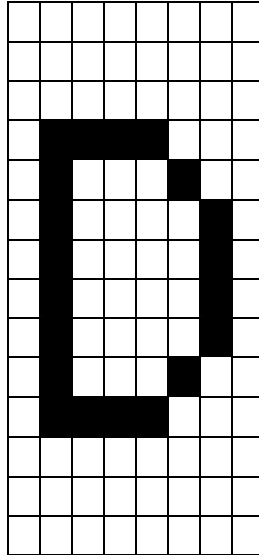
3.7.2 Low Character
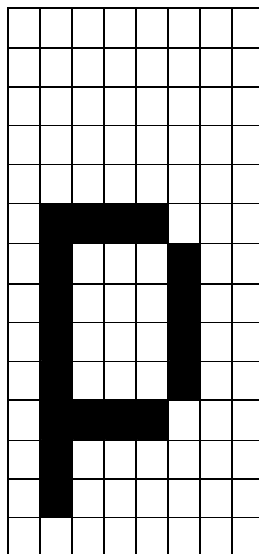
3.7.3 Underline

When underline characters are printed the last line in the character matrix will be marked.

3.7.4 Bold

When bold characters are printed the character is or with itself shifted right.

3.7.5 Reverse

When reverse characters are printed the character matrix will be negated.

3.7.6 Italic.

When Italic characters are printed every line will be shifted the following number of dots to the right:
(Line number from bottom)/4

3.7.7 Font sizes.

Font	Width	Height
Small	Normal	Normal
Low	Double	Normal
Narrow	Normal	Double
Normal	Double	Double
Wide	Double	Quadruple
High	Quadruple	Double
Large	Quadruple	Quadruple
Xlarge	Octuple	Octuple

When the size is normal or greater a build in smooth function will smooth the characters.

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3.8 I/F-COM simple command set.

The following commands are use when communicating with the printer controller. All other commands is ignored

3.8.1 Small Font

[Name]   Small Font (8x12)
[Format]   ASCII   NUL
                Hex   00
                Decimal   0
[Description]   Chooses small font from the current print position.

3.8.2 Low Font

[Name]   Low Font (16x12)
[Format]   ASCII   SOH
                Hex   01
                Decimal   1
[Description]   Chooses low font from the current print position.

3.8.3 Narrow Font

[Name]   Narrow Font (8x28)
[Format]   ASCII   STX
                Hex   02
                Decimal   2
[Description]   Chooses narrow font from the current print position.

3.8.4 Normal Font

[Name]   Normal Font (16x28)
[Format]   ASCII   ETX
                Hex   03
                Decimal   3
[Description]   Chooses normal font from the current print position.
                This is the default font after power up or reset.

3.8.5 Wide Font

[Name]   Wide Font (32x28)
[Format]   ASCII   EOT
                Hex   04
                Decimal   4

[Description] Chooses wide font from the current print position.

3.8.6 High Font

[Name]   High Font (16x56)
[Format]   ASCII   ENQ
              Hex   05
              Decimal   5
[Description] Chooses high font from the current print position.

3.8.7 Large Font

[Name]   Large Font (32x56)
[Format]   ASCII   ACK
              Hex   06
              Decimal   6
[Description] Chooses large font from the current print position.

3.8.8 Xlarge Font

[Name]   Xlarge Font (64x112)
[Format]   ASCII   BEL
              Hex   07
              Decimal   7
[Description] Chooses Xlarge font from the current print position.

3.8.9 Line Feed

[Name]   Line Feed
[Format]   ASCII   LF
              Hex   0A
              Decimal   10
[Description] When the printer controller receives this byte the text
              data in the buffer will be printed

3.8.10 Barcode on

[Name]   Barcode on
[Format]   ASCII   VT
              Hex   0B
              Decimal   11
[Type]   Barcode 39
[Description] Turns the barcode on until non-barcode character
received.
[Barcode char.] Space , $, % , * , + , - , . , / , 0-9 , A-Z
[Notes]   The barcode 39 must start and end with the character
              '*'. This character is the start and stop character in

barcode 39, and the '*' can only be used as start and end character.

If the barcode length exceeds the paper size the last barcode character will not be written as barcode. In that case the barcode cannot be read because the last character will not be '*'

3.8.11 Feed Forward

[Name]	Feed Forward	
[Format]	ASCII	FF
	Hex	0C
	Decimal	12
[Description]	When this command is received the printer will print whatever data it has in the buffer and feed forward 50mm	

3.8.12 Reverse off

[Name]	Reverse off	
[Format]	ASCII	SO
	Hex	0E
	Decimal	14
[Description]	This command will switch off reverse printing	

3.8.13 Reverse on

[Name]	Reverse on	
[Format]	ASCII	SI
	Hex	0F
	Decimal	15
[Description]	This command will switch on reverse printing	

3.8.14 Underline off

[Name]	Underline off	
[Format]	ASCII	DLE
	Hex	10
	Decimal	16
[Description]	This command will switch off underline printing	

3.8.15 Underline on

[Name]	Underline on	
[Format]	ASCII	DC1

Hex   11
Decimal   17
[Description]   This command will switch on underline printing

3.8.16 Bold off

[Name]   Bold off
[Format]   ASCII   DC2
                 Hex   12
                 Decimal   18
[Description]   This command will switch off bold printing

3.8.17 Bold on

[Name]   Bold on
[Format]   ASCII   DC3
                 Hex   13
                 Decimal   19
[Description]   This command will switch on bold printing

3.8.18   Italic off

[Name]   Italic off
[Format]   ASCII   DC4
                 Hex   14
                 Decimal   20
[Description]   This command will switch off italic printing

3.8.19 Italic on

[Name]   Italic on
[Format]   ASCII   NAK
                 Hex   15
                 Decimal   21
[Description]   This command will switch on italic printing

3.8.20   Initialise Printer

[Name]   Initialise
[Format]   ASCII   SYN
                 Hex   16
                 Decimal   22
[Description]   When the printer controller receives this byte a reset of
                 the printer will be initialised. This command can be
                 treated even if buffer is full.

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3.8.21 Request Software version

[Name]   Request software version

[Format]   ASCII   ETB

                   Hex   17

                   Decimal   23

[Description]   When the printer controller receives this byte the software version will be transmitted. This command can be treated even if buffer is full.

3.8.22 Request Status

[Name]   Request status

[Format]   ASCII   CAN

                   Hex   18

                   Decimal   24

[Description]   When the printer controller receives this byte a status byte will be transmitted. This command can be treated even if buffer is full.

The bit definitions is as follows

Bit	Status	0	1
0	Near end	Logic level is low	Logic level is high
1	Paper	Present	Absent
2	Temperature	Not too hot	Head too hot to print
3	Head	Closed	Open
4	Paper Jam	No error	Error
5	Rxerror	No error	Rx error
6	Buffer	Not full.	Full (less than 16 bytes left)
7	Always 1.		

3.8.23 Request Analog voltage.

[Name]   Analog voltage

[Format]   ASCII   EM

                   Hex   19

                   Decimal   25

[Description]   When the printer controller receives this byte the digital value of the head voltage will be transmitted. This command can be treated even if buffer is full

3.8.24 Request Temperature

[Name]   Request Temperature

[Format]   ASCII   SUB

                   Hex   1A

                   Decimal   26

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[Description]   When the printer controller receives this byte the digital value of the head temperature will be transmitted. This command can be treated even if buffer is full

3.8.25 Sub command set
[Name]   Sub command set
[Format]   ASCII   ESC n
Hex   1B   n
Decimal   27   n
[Range]   n: [-128;127]
[Description]   The n is the commands in the sub-set.

3.8.26 Upgrade command
[Name]   Upgrade command
[Format]   ASCII   ESC Z
Hex   1B   5A
Decimal   27   90
[Description]   Only used by the I/F-COM A/S upgrade programs.

3.8.27 Set auxiliary output
[Name]   Set auxiliary output
[Format]   ASCII   ESC p   n
Hex   1B   70   n
Decimal   27   112   n
[Description]   When this command is received then the auxiliary output can be set.
If n = 0, then the output will be set to off
If n > 1 and < 254 then the output will be turned on in n/4.096msec, and then turned off again.
If n = 255, then the output will be turned on.

3.8.28 Automatic sending status
[Name]   Automatic sending status
[Format]   ASCII   ESC a
Hex   1B   61
Decimal   27   97
[Description]   When this command is sent once, then the board will transmit the status every time that it change state.

3.8.29 Stop sending automatic status

[Name]	Stop sending automatic status
[Format]	ASCII ESC b
	Hex 1B 62
	Decimal 27 98
[Description]	When this command is sent then it will turn off transmitting status.

3.8.30 Color/Grey scale graphic

[Name]	Colour / Grey scale graphic
[Format]	ASCII ESC c n
	Hex 1B 63 n
	Decimal 27 99 n
[Description]	When this command is sent then will the board not feed. After the next graphic data (both compression and not). The n is a percent of the burn ratio, n can be from 0 to 15, and the burn ratio is 100/15*n. This command is used by the driver to make colour and grey scales printout.

3.8.31 Enable saving data

[Name]	Enable saving data
[Format]	ASCII ESC d
	Hex 1B 64
	Decimal 27 100
[Description]	This command will enable that the boards save values to the flash, this is made to ensure that a wrong transmission not will change settings in the board, remember to send the command "Saving data to board", to actual save the data.

3.8.32 Save data to board

[Name]	Save data to board
[Format]	ASCII ESC e
	Hex 1B 65
	Decimal 27 101
[Description]	This command saves all settings to flash.

3.8.33 Change dot size

[Name]	Change dot size
[Format]	ASCII ESC f n
	Hex 1B 66 n
	Decimal 27 102 n
[Description]	If n = 0x01, then the board is set to FTP628MCLxxx. If n = 0x02 then is it set to FTP638MCLxxx. The value is saved to flash,

3.8.34 Change form feed length

[Name]	Change form feed length
[Format]	ASCII ESC g n
	Hex 1B 67 n
	Decimal 27 103 n
[Description]	N represents the value in mm that is form feeded after the feed command is sent. The value is saved to flash.

3.8.35 Change baud rate

[Name]	Change baud rate
[Format]	ASCII ESC h n
	Hex 1B 68 n
	Decimal 27 104 n
[Description]	N represents the new baud rate, legal values for n = 1 to 255. The baud rate is calculated as 921600/n = new baud rate. For instance 921600/8 = 115200baud. The value is saved to the flash

3.8.36 Change form feed time

[Name]	Change form feed time
[Format]	ASCII ESC i n
	Hex 1B 69 n
	Decimal 27 105 n
[Description]	N represents the time between that the board registry incoming paper, and to it starts feed the auto form feed length. The time is calculated as n * 50msec. The default setting is 2 seconds. The value is saved to flash. Legal values for n are between 1 and 255.

3.8.37 Feed Paper

[Name]	Feed Paper		
[Format]	ASCII	GS	n
	Hex	1D	n
	Decimal	29	n
[Range]	n: [-128;127]		
[Description]	When the printer controller receives this command the paper will be fed n-dot lines. If the value is negative a reverse form feed will be made.		

3.8.38 Compensate Burn time

[Name]	Compensate burn time		
[Format]	ASCII	RS	n
	Hex	1E	n
	Decimal	30	n
[Range]	n: [-15;15]		
[Description]	When the printer controller receives this command the burn time will be compensated. If a negative value is send the printout intensity will be lighter and if a positive value is send the printout intensity will be darker.		

3.8.39 Bar code width setting

[Name]	Bar code width setting			
[Format]	ASCII		ESC e	m
	Hex	1B	65	m
	Decimal	27	101	m
[Range]	2<=m			
[Default]	m=6			
[Description]	Parameter n is ignored			

Parameter m is used to determine the dot width of the narrow and wide bar lines. The wide bar lines is equal to m dots and the narrow is equal to m/2 dots (rounded down).

3.8.40 Bar code height setting.

[Name]	Bar code height setting
[Format]	ASCII ESC h n
	Hex 1B 68 n
	Decimal 27 104 n
[Range]	1<=n<=255
[Default]	n=60
[Description]	Parameter n specifies the height of a bar code in dots.

3.8.41 Bar code printing

[Name]	Bar code printing
[Format]	ASCII ESC k m n d1 to dn
	Hex 1B 6B m n d1 to dn
	Decimal 27 107 m n d1 to dn
[Description]	Parameter m specifies the type of bar codes to be printed.

Parameter n specifies no of barcode characters.

m(dec)	Type of Barcode	Number of barcode characters	Value of d
65	UPCA	11<=n<=12	48<=d<=57
67	EAN13	12<=n<=13	48<=d<=57
68	EAN8	7<=n<=8	48<=d<=57
69	Code39	Variable	Space , $, % , * , + , - , . , / , 0-9 , A-Z
72	Code128	Variable	0 to 105

UPCA: if n is 11 then the board calculate the checksum

EAN8: if n is 7 then the board calculate the checksum.

EAN13: if n is 12 then the board calculate the checksum

Code 39: The first and last character must be '*'. This is the syntax for Code 39.

Code128. There is three subset of Code128 (Code128A, Code128B and Code128C). The start character specifies which character set to be used. The start character must be either 103 (subset A), 104 (subset B), 105 (subset C).

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The following table shows the value between data (d) and barcode.

Code128 barcode table

'd'	A	B	C	'd'	A	B	C
0	Space	Space	0	52	T	T	52
1	!	!	1	53	U	U	53
2	"	"	2	54	V	V	54
3	#	#	3	55	W	W	55
4	$	$	4	56	X	X	56
5	%	%	5	57	Y	Y	57
6	&	&	6	58	Z	Z	58
7	'	'	7	59	[	[	59
8	(	(	8	60	\	\	60
9	)	)	9	61	]	]	61
10	*	*	10	62	^	^	62
11	+	+	11	63	_	_	63
12	,	,	12	64	NUL	`	64
13	-	-	13	65	SOH	a	65
14	.	.	14	66	STX	b	66
15	/	/	15	67	ETX	c	67
16	0	0	16	68	EOT	d	68
17	1	1	17	69	ENQ	e	69
18	2	2	18	70	ACK	f	70
19	3	3	19	71	BEL	g	71
20	4	4	20	72	BS	h	72
21	5	5	21	73	HT	i	73
22	6	6	22	74	LF	j	74
23	7	7	23	75	VT	k	75
24	8	8	24	76	FF	l	76
25	9	9	25	77	CR	m	77
26	:	:	26	78	SO	n	78
27	;	;	27	79	SI	o	79
28	<	<	28	80	DLE	p	80
29	=	=	29	81	DC1	q	81
30	>	>	30	82	DC2	r	82
31	?	?	31	83	DC3	s	83
32	@	@	32	84	DC4	t	84
33	A	A	33	85	NAK	u	85
34	B	B	34	86	SYN	v	86
35	C	C	35	87	ETB	w	87
36	D	D	36	88	CAN	x	88
37	E	E	37	89	EM	y	89
38	F	F	38	90	SUB	z	90
39	G	G	39	91	ESC	{	91

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40	H	H	40	92	FS			92
41	I	I	41	93	GS	}	93
42	J	J	42	94	RS	~	94
43	K	K	43	95	US	DEL	95
44	L	L	44	96	FNC3	FNC3	96
45	M	M	45	97	FNC2	FNC2	97
46	N	N	46	98	SHIFT	SHIFT	98
47	O	O	47	99	Code C	Code C	99
48	P	P	48	100	Code B	FNC 4	Code B
49	Q	Q	49	101	FNC 4	Code A	Code A
50	R	R	50	102	FNC 1	FNC 1	FNC1
51	S	S	51				

3.8.42 Black Mark

[Name]	Set black mark parameters:		
[Format]	ASCII	RS	n
	Hex	1E	n
	Decimal	30	n

[Range] n: [-15;15]

[Description] When Black mark is enabled:

[Format]	ASCII	ESC+205+3+97+m+n+o	
	Hex	1B CD 03 61 m n o	
	Decimal	27 205 3 97 m n o	

[Range] m = Page length 1…255
n = Paper offset 1…255
o = Black mark length 1…255

[Description] At printer stop on black mark the paper will be forwarded the full length of the black mark. Paper out is detected if full length of the Black Mark is feeded and sensor does not detect paper.

At no paper in printer and printing is requested, form feed of black Mark Length will be executed. At no paper detected the printer will stop.
FF=0xC Feed paper forward until next Black Mark or rest of page whatever comes first.

The following values can be set:

PAGE LENGTH (default 150mm) This value is the paper length

PAPER OFFSET (default 2mm) This value is the length between Black Mark and start of printing. Value must be between 2 mm. and Page length – 2mm.
BLACKMARK LENGTH (default 15mm). This is the length of the Black Marks.

The board can be set to transmit a 'B' whenever the paper is not detected at paper detect. This is typical when the sensor encounters a Black Mark.

The following commands is used for enabling Black Mark

Default:
        PAGELENGHT=150mm
        PAPEROFFSET=2mm
        BLACKMARK=120 (120/8=15mm)

ESC+205+1+98+n
n: Bit 0: if set the board will transmit 'B' every time paper is not detected at the paper detector.
Bit 1: if set the Black Mark function is enable.
Default n = 0.

3.8.43 Graphic data – non compressed

[Name]	Graphic data – non-compressed		
[Format]	ASCII	US	d1,d2,..,dX
	Hex	1F	d1,d2,..,dX
	Decimal	31	d1,d2,..,dX
[Range]	n: [0;255]		
	X=54 for FTP628MCLxxx, X=72 for FTP638MCLxxx,		
[Description]	When the printer controller receives this command the X graphic bytes (d1-dX) will be printed in one dot line. The MSB in d1 is the left most dot and the LSB in dX is the right most dot.		

3.8.44 Graphic data – compressed

[Name]	Graphic data – compressed		
[Format]	ASCII	Y	d1,d2,..,d(-Y)
	Hex	Y	d1,d2,..,d(-Y)
	Decimal	Y	d1,d2,..,d(-Y)
[Range]	Y: [-X;-2]		
	n: [0;255]		
	X=54 for FTP628MCLxxx, X=72 for FTP638MCLxxx,		

[Description]   When the printer controller receives a byte that is –Y to –2 (Decimal 256-Y to 254) the following data is compressed data. The number of compressed graphic bytes is the negative value.

This means:
If Y = -10 (Decimal 246) the next 10 bytes is compressed data.

The compressed data is as follows.
When a data byte is 0 (no dots activated) the next byte received is the number of bytes that are 0. All other data is send as non compressed.
A very few lines cannot be compressed. These will if you try to compress them be longer than the non-compressed line. These must therefore be send as non-compressed data.

3.8.45 Escape sequences, overview.

ESCAPE SEQUENCES, ASCII	FUNCTION
NUL	Small Font
SOH	Low Font
STX	Narrow Font
ETX	Normal Font
EOT	Wide Font
ENQ	High Font
ACK	Large Font
BEL	Xlarge Font
LF	Line Feed
VT	Print barcode
FF	Forward feed
SO	Reverse off
SI	Reverse on
DLE	Underline off
DC1	Underline on
DC2	Bold off
DC3	Bold on
DC4	Italic off
NAK	Italic on
SYN	Initialize printer

ETB	Request software version
CAN	Request status
EM	Request analogue voltage
SUB	Request temperature
GS+n	Feed paper
RS+n	Burn compensate
US+d1..dX	Print graphic line
ESC+205+3+97+m+n+o	Set black mark parameters
ESC e+m	Bar code width setting
ESC k+m n+d1 to dn	Bar code printing
ESC h+n	Bar code height setting

4   Maintenance

4.1   Daily use

Printer and interface board must be switch off while in idle mode.

4.2   Store/Transport

The product has to be stored under ESD safe conditions, and to be packed safely during transportation.

5 Specifications

5.1 Electrical Data

Voltage: 6-8,5VDC

Current: Maximum head current: $\dfrac{\text{Numbers of active dots} * V_{head}}{150 +/- 15\%}$

Maximum motor current: 1000mA

Power up sequence: max. 10 msec. 10 – 90% Voltage applied
Power down sequence: max. 10 msec. 90 – 10% Voltage applied

5.2 Mechanical Data

Dimensions: Length, width, height: 77 mm* 50 mm * max. 15 mm
Including connectors.
Vibration: 100G XYZ
Shock: 100G XYZ

5.3 Environmental Data

Operation: Temperature: -20°C- +85°C
Humidity: 10%-99% RH, without condensing
Storage: Temperature: -40°C - +85°C
Humidity: 0%-99% RH, without condensing
Transport: Temperature: -40°C - +85°C
Humidity: 0%-99% RH, without condensing

5.4 EMC & ESC

The printer controller is tested according to:
Emission: E-Field: EN50081-1-1
Conducted: EN50081-1-2
Immunity: E-field: EN50082-1-1
Conducted transients: EN50082-1-2
Over voltage: EN50082-1-3
Medical equipment: IEC601-1-2

ESD: 4 kV contact discharge against parts exposed to contact at normal use. 8 kV air discharge.

5.5 Temperature Test

Temperature shock: (no voltage applied) -28°C to +100°C at 1 sec. 100 times: no damage.

6 Connector Pin Assignment

6.1.1 Thermal Head connector

FTP628MCL05x/1xx/35x
Connector CN1: 3800-30P-T-S
Mating connector part number:
TBA

Pin	Function	Pin	Function
1	LED GND	16	TI1
2	+5V	17	/ST2/GND
3	P1	18	/ST1
4	GND	19	/ST7/ /AOE1
5	SW	20	/ST6/ /AOE1
6	VH	21	GND
7	VH	22	GND
8	DI	23	/LAT
9	CLK	24	DO
10	GND	25	VH
11	GND	26	VH
12	/ST5	27	/MB
13	/ST4	28	MB
14	/ST3	29	MA
15	+5V	30	/MA

6.1.2 Thermal Head connector

FTP628MCL00x/30x
Connector CN: 3700-30P-T-T
Mating connector part number:
TBA

Pin	Function	Pin	Function
1	LED	16	/ST2/GND
2	+5V	17	/ST1
3	P1	18	TI1
4	VH	19	GND
5	VH	20	GND
6	GND	21	GND
7	GND	22	VH

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8	DI	23	VH
9	/LAT	24	NC
10	CLK	25	SW
11	/ST6/ /AOE1	26	GND
12	/ST5	27	/MB
13	/ST4	28	MB
14	+5V	29	/MA
15	/ST3	30	MA

6.1.3 IRDA connector

IRDA connector CN3: B4B-ZR
Mating connector part number:
TBA

Pin	1	2	3	4
Function	+5V	TX	RX	GND

6.1.4 Cutter connector

Cutter connector CN6: 5501-04TS
Mating connector: TBA

Pin	Function	Pin	Function
1	/Sense	3	CUT
2	GND	4	/CUT

6.1.5 AUX INPUT connector

Connector type CN4: 53324-0710
Mating connector part number:
Housing: TBA
Contact: TBA

CN4:

Pin	Function	Pin	Function
1	LED1+	4	LED2+
2	INPUT1	5	INPUT2
3	GND	6	GND
7	GND		

The paper near end status, can be seen on the LED on the aux connector, it can be reading through the status command, and if a driver is used, then it can be reading in the port monitor: If paper jam is used, then will the printer stop printing if this signal is going low, the value of this bit can be seen on the LED on the aux output connector, it can be reading by a status request, or if a driver is used, then it can be reading by the port monitor

The paper near end and paper jam is indicated on LED at the AUX connector CN4. The status of these bits can also be read with a response on a status request. If a driver is used, then the status can also be read in the print monitor. If paper jam sensor is activated printing will stop until paper jam sensor is deactivated. The LED will show these conditions.

The LED will show these conditions

LED	Error
Off	No Error
Flash 1Hz	Paper near end
Flash 2Hz	Paper jam
On	Both paper jam and near end

6.1.6 Power connector

Power connector CN7: 43045-0400
Mating connector
TBA

Pin	Function	Pin	Function
1	GND	3	GND
2	+8.5V	4	+8.5V

6.1.7 USB connector

USB connector CN5: UBBR-04SW11
Mating connector:

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TBA

Pin	1	2	3	4
Function	N.C.	USB-	USB+	GND

6.1.8 AUX connector

Connector type CN11: 53324-0510
Mating connector
TBA
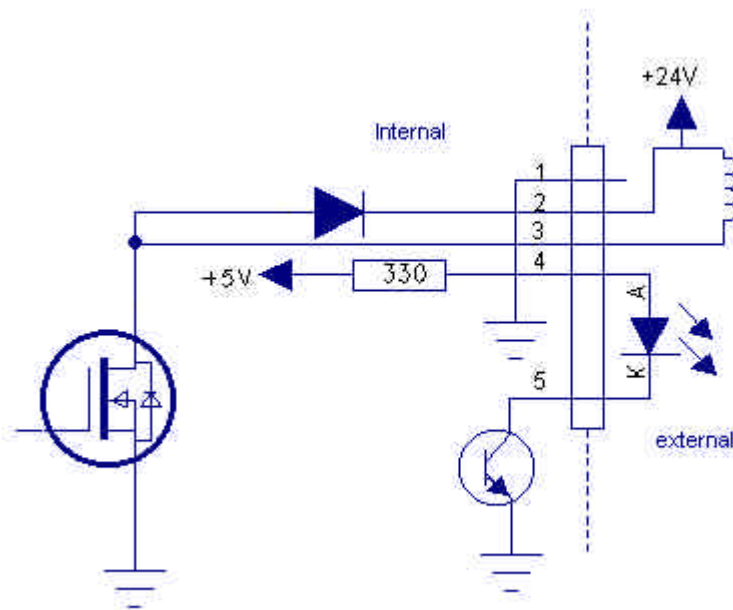
Pin	1	2	3	4	5
Function	GND	Vcoil, Max 24V	Coil, max 1A	Anode	Cathode

Using output as cash drawer solenoid time must be set. By default solenoid time is 0,5 sec.

Using output for winding motor, connector must be applied.
Upon feeding with motor the winding motor also turns. Please see manual for winding motor for more information

6.1.9 Serial connector

Connector type CN9: IDH10S1GN

Mating connector part number: FC10AGN (Taitek)

Pin	Function	Pin	Function
1	NC	2	DSR
3	TX	4	CTS
5	RX	6	RTS
7	DTR	8	NC
9	GND	10	NC

6.2   Mechanical Drawings
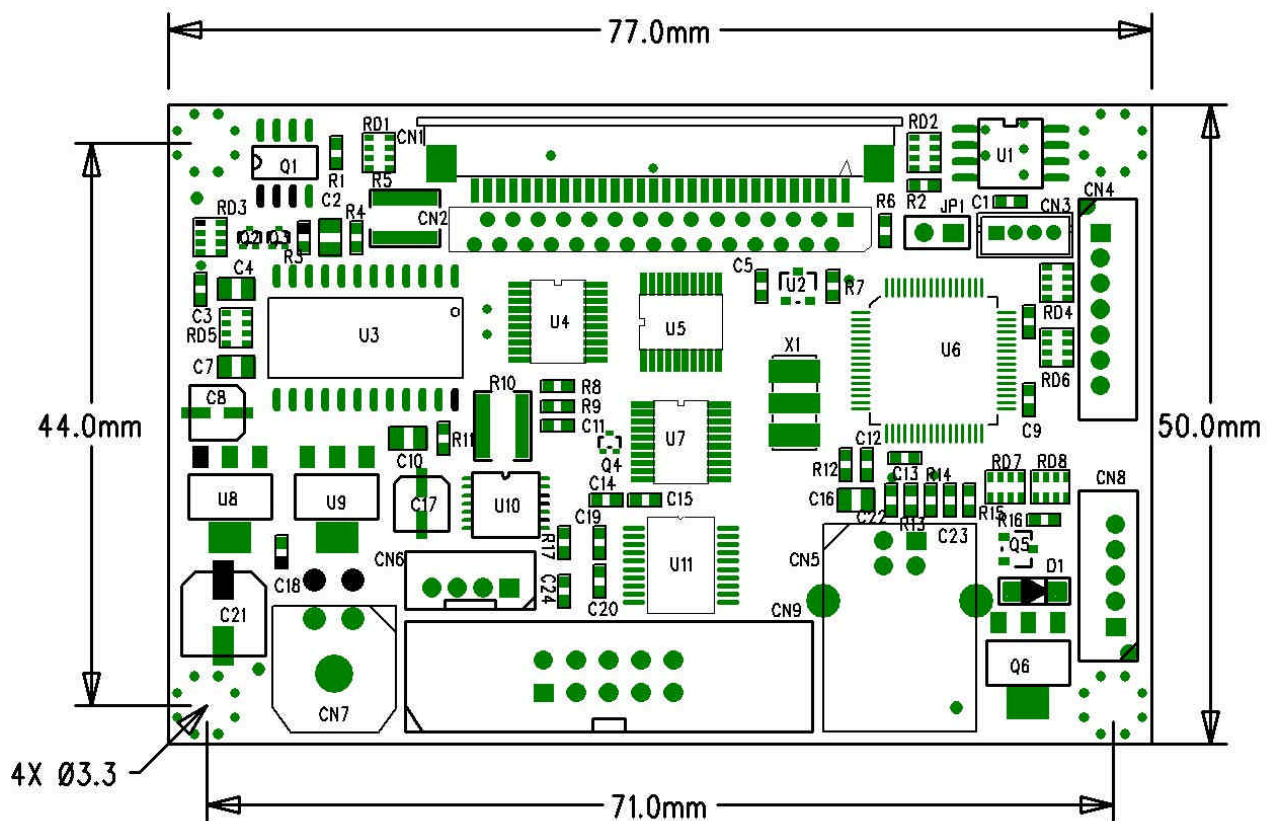
7 Appendix

7.1 Seiko compatible command set (optional)

7.1.1 Escape sequences, overview.

CR	CR Carriage Return
ESC+ ' J ' +n	Print and Feed Forward
ESC+ ' j ' +n	Print and Feed Backward
ESC+ ' 2 '	16-dot Line Spacing
ESC+ ' 0 '	4-dot Line Spacing
ESC+ 'A'+n or ESC+ '3'+n n-dot	Line Spacing
ESC+ SP+n	Character Spacing
ESC+ ' s '+nl+nr	Left/Right Character Spacing
ESC+ ' U '+n	Inverse Print
DC2+ ' Y' +n	Character Rotation
ESC+ ' - ' +n	Underline
SO	Double-Width (with automatic reset) ON
DC4	Double-Width (with automatic reset) OFF
ESC+ ' W '+n	Double-Width
ESC+ ' w '+n	Double-Height
ESC+ ' I '+n	Reverse
DC2+ ' F '+n	Font Size Selection
ESC+ ' t '+n	Character Set Select
ESC+ ' & ' + s + e+	Font Data Downloaded Character Define
ESC+ ' % ' + n	Downloaded Character Select
DC2+ ' D '+n	Downloaded Character Area Operation
ESC+ '+' + k1 + k2+	ESC+ '+' + k1 + k2+ Font Data
FS+ ' 2 ' + k1 + k2+	Font Data User-Defined Character Define
ESC+ ' K ' or FS+ ' & '	Kanji Mode Specify
ESC+ ' H' or FS+ '. '	Kanji Mode Clear
DC2+ ' G '+n	User Defined Character Area Operation
DC2+ ' P ' + s + e+ x + y +	Font Data Option Font Define
DC2+ ' O '+n	Option Font Select/Deselect

DC2+ ' Q '	Option Font Clear
DC3+ ' A '	Ruler Line Buffer A
DC3+ ' B '	Ruler Line Buffer B
DC3+ ' V ' +	Image Data Ruler Line Image
DC3+ ' D '+nl+nh	Define Ruler Line by Dot
DC3+ ' L '+ml+mh+nl+nh	Define Ruler Line by Line
DC3+ ' F '+n1+n2	Define Ruler Line with Repeating Pattern
DC3+ ' + '	Ruler Line ON
DC3+ ' - '	Ruler Line OFF
DC3+ ' P '	Print One Dot Line after Printing Line Buffer Data
DC3+ ' C '	Ruler Line Buffer Clear
DC3+ ' ('	Continuous Ruler Line Control Code Input

7.2   Fujitsu compatible command set (optional)

7.2.1   Escape sequences, overview.

HT	Horizontal tab
LF	Line feed with printing
FF	Forms feed
ESC RS:	Black-white reversed printing specification
ESC US:	Black-white reversed printing cancellation
ESC !+n:	Printing mode specification
ESC %+n:	Download character set specification/cancellation (valid only when optional memory is installed)
ESC &+y+c1+c2+x+[d]k :	Download character definition (valid only when optional memory is installed)
ESC *+m+n1+n2+[d]k :	Bit image mode specification
ESC ?+n	External registration character deletion (valid only when optional memory is
ESC 2	1/6-inch line pitch setting
ESC 3+n	Minimum-pitch-unit line pitch setting
ESC @	Printer initialisation
ESC A+n	Line spacing setting
ESC C+n	Page length (number of lines) setting
ESC D+[n]k+NUL	Horizontal tab position setting

ESC J+n	Printing and minimum-pitch-unit paper feed
ESC K+n	Backward paper feed
ESC R+n	International character specification
ESC c+1+n	Internal processing setting
ESC d+n	Printing and n-line feed
ESC e+n	Printing and backward n-line feed
ESC s+n	Printing speed setting
ESC t+n	Character code table selection
ESC {+n	Upside-down printing setting/cancellation
FS 9+n	Detection function enable/disable setting
GS <	Mark detection execution
GS A+m+n	After-mark-detection head detection distance setting
GS E+n	Print quality setting
GS V+n+m	Paper cutting
GS e+n+m	Bar code width setting
GS h+n	Bar code height setting
GS k+m+n+[d]k	Bar code printing
GS w+n	Bar code width magnification setting
FS *+n1+n2+[n]k	High speed collective image printing specified
GS &+m+x+y1+y2+[n]k	Registration of image data
GS '+m+n	Print registered image data
FS E+n	Correction of impressed energy
ESC V+n	Right rotation 90º
GS a+n	Setting and cancellation of status transmission.
FS r+n	Parameter transmission
ESC EM+n	Setting the amount of the feeding at automatic paper feed
ESC X+n+m	Setting the turning time of the motor excitation

Line Feed
[Name]   Line Feed
[Format]   ASCII   LF
              Hex   0A
              Decimal   10
[Description] When the printer controller receives this byte the text
              data in the buffer will be printed

Horizontal tab
[Name]   Horizontal tab
[Format]   ASCII   HT
              Hex   0A

Decimal   10

[Description]   When the printer controller receives this byte the text
data in the buffer will be printed

7.3 APS compatible command set (optional)

7.3.1 Escape sequences, overview.

GS / n	Set printing speed / Maximum peak current
GS D n	Set print Intensity
ESC v	Send printer status
ESC I	Send printer identity
ESC @	Resets printer
ESC S	Puts the printer in sleep mode
GS B n	Serial Communication setting
GS b n	Set parallel port Busy line hold time
ESC % n	Select internal Character Set
ESC R n	Select international character Set
ESC 3 n	Set line spacing
ESC SP n	Set character spacing
ESC ! n	Set print mode
ESC { n	Set/reset Rotated character
LF	Line feed
CR	Carriage return
ESC J n	Feed paper (n dot lines) forward
ESC j n	Feed paper (n dot lines) backward
CAN	Cancel print data buffer (text mode)
ESC * n1 n2 n3 n4 n5 n6, data	Print graphics
ESC $ n1,n2	Horizontal dot positioning
ESC V n1,n2,n3 data	Horizontal bit image
ESC m	Partial cut
ESC i	Full cut
GS k n [Start] <data> NUL	Print bar code
GS h n	Barcode Height
GS w n	Barcode magnification
GS H n	Text position in Barcode
GS L n	Set Mark length
GS T n Se	Set TOF position
GS E	TOF feed paper
GS X n1 n2	Set Mark to Cut Position
GS x n1 n2	Set Cut Line to Head Dot line Length

GS / n
Description: Set printing speed / Maximum peak current/
                        Dynamic division

Format:	<1Dh> <2Fh> <n>
Comments:	n=1 to 32: (Default n=5) Software programmable consumption (Dynamic division). The maximum number of black dots which are simultaneously heated is (n+1) x 8. In Default Mode, n = 5.
Example:	n=5 Maximum black dots heated: (5+1)*8=48. Printer Peak consumption @5V: (0.3A (Stepper Motor) + 5*48/160) = 1.8A 160 Ohms is the dot resistance.

GS D n

Description:	Set print Intensity
Format:	<1Dh> <44h> <n>
Comments:	n=8Fh (127d) : (Default). Nominal print intensity n>8Fh (127d) : Printout becomes darker n<8Fh (127d) : Printout becomes lighter (n from 0 to 255 (FFh)).

ESC v

Description:	Send printer status
Format:	<1Bh> <76h>
Comments:	The printer returns a single byte that reflects the status of the printer in accordance with the following table:

BIT	FUNCTION	BIT = 0	BIT = 1
0	Head temperature	OK	Too high or too low
1	Head-up	No	Yes
2	Paper out	No	Yes
3	Power supply	OK	Too high or too low
4	Printer in use	Ready	Action in progress
5	On/Off line	Off	On
6	Hole/Mark detection Error	No	Too short, too long or not found
7	Cutter failure	Yes	No

This command is executed immediately after being received, even in case of a full buffer
(DTR/RTS, Xoff or Busy active). Host must disable the handshaking controls to send the ESC v
command.
When using the parallel port, the software continuously updates PE signal. To read the
status byte, use the Byte Mode (Parallel communication) as described in section 3.4.2, after
having sent the ESC v command.

## 7.4 ESC/POS compatible command set (optional)

7.4.1 Escape sequences, overview.

|	
ESC c 4	Select Paper Near End Sensors to stop printing
HT	Horizontal Tab
LF	Print and Line feed
FF	Print and return to standard Mode
CR	Print and carriage return
DLE EOT n	Real Time status transmission
DLE ENQ n	Real time request to printer
CAN	Cancel print data in page mode
ESC FF	Print data in page mode
ESC SP n	Set right side character spacing
ESC ! n	Select print mode(s)
ESC$ nL nH	Set absolute print position
ESC * m nL n H [d]k	Select bit image mode
ESC - n	Turn underline mode on/off
ESC 2	Select 1/6-inch spacing
ESC 3 n	Set line spacing
ESC = n	Set peripheral device
ESC ? n	Cancel user defined characters
ESC @	Initialize printer
ESC [n] k NUL	Set horizontal tab position
ESC E n	Turn emphasized mode on/off
ESC G n	Turn on/off double strike mode
ESC J n	Print and feed paper
ESC L	Select page mode
ESC R n	Select an international character set
ESC S	Select standard mode
ESC T n	Select print direction in page mode
ESV V n	Turn 90°clockwise rotation mode on/off
ESC W xL xH yL yH dxH dyL dyH	Set printing in page mode
ESC c 5 n	Enable/Disable panel buttons
ESC c 3 n	Select paper near end sensors to output end signals
ESC a n	Select justification
ESC \ nL nH	Set relative print position
ESC d n	Print and feed n lines

ESC i	Partial cut
ESC p m t1 t2	Cash drawer Output
ESC t n	Select character Code table
ESC u n	Transmit peripheral device status
ESC v	Transmit paper sensor status
ESC { n	Turns on/off upside-down printing mode
GS ! n	Select character size
G S $ nL nH	Set absolute vertical print position in page mode
GS * x y [d] x*y *8	Define download bit image
GS / m	Print downloaded bit image
GS :	Start / end macro definition
GS B n	Turn white/black reverse printing mode
GS H n	Select printing position for HRI characters
GS I n	Transmit printer ID
GS L nL nH	Set left margin
GS P x y	Set horizontal and vertical motion units
GS V m n	Select cut mode and cut paper
GS W nL nH	Set printing area width
GS \ nL nH	Set relative vertical print position page mode
GS ^ r t m	Execute macro
GS a n	Enable /Disable Automatic Status back
GS b n	Turns smoothing mode on/off
GS f n	Select font for Human Readable Interpretation (HRI) characters
GS h n	Select bar code height
GS k m d1…dk NUL	Print bar code
GS k m n d1…dn	Print bar code
GS r n	Transmit status
GS w n	Set bar code width

7.5 Optional sensor description

PAPER NEAR SENSOR
OR
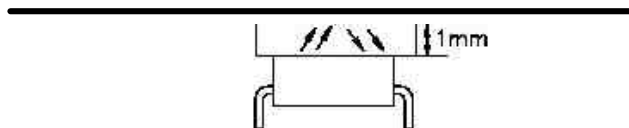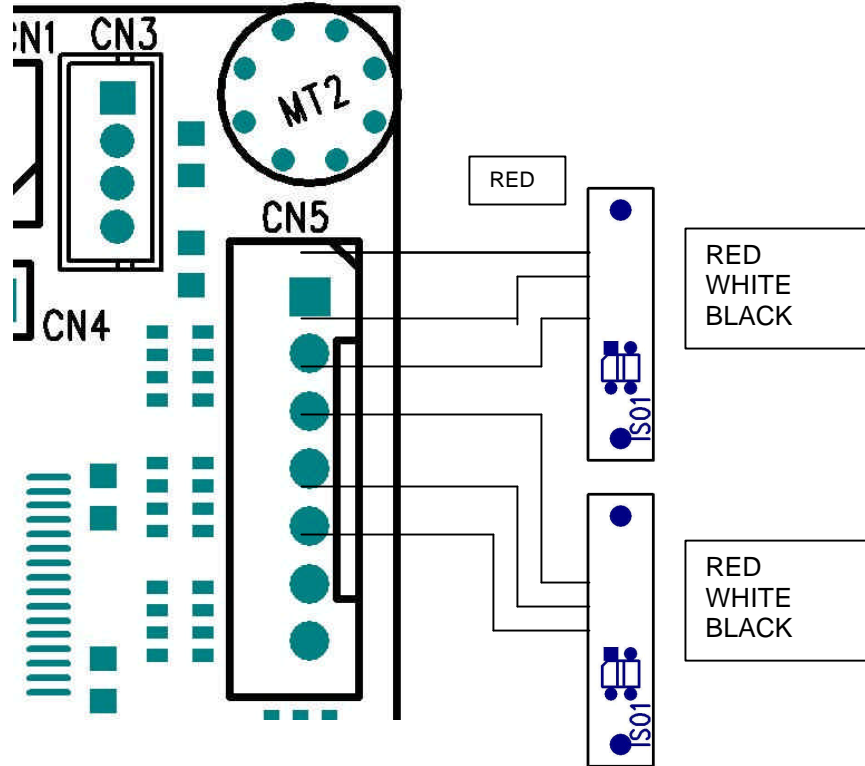BLACK MARK SENSOR
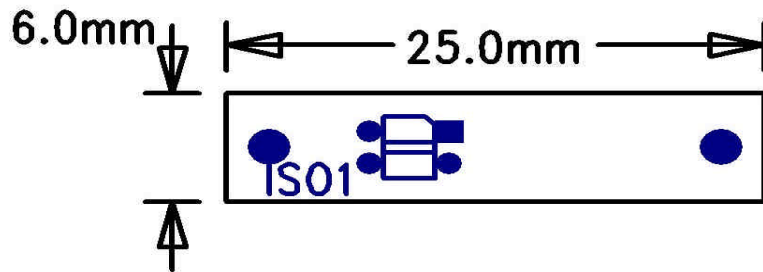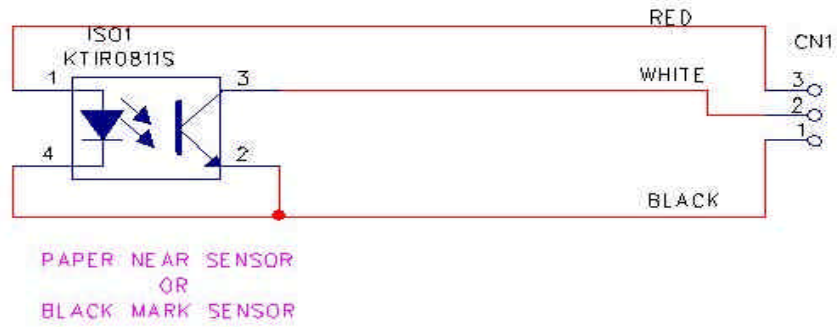
Top view
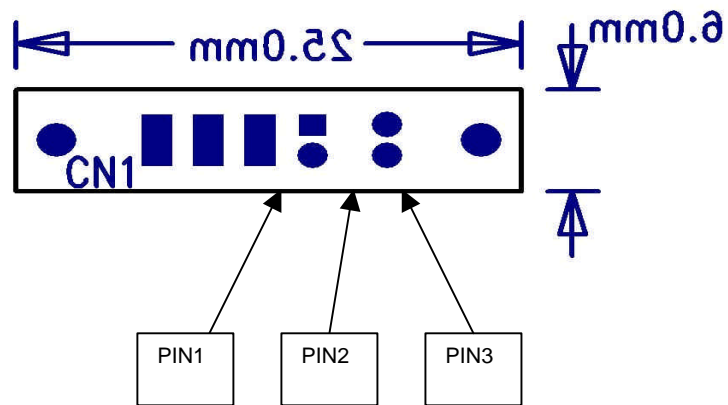
Bottom view

Please note that distance from top of sensor to paper must be Min 0,5mm and Max 1,00mm

Example showing how to connect PRS600 to AUX Input connector CN4 on PRN608-S standard board.

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